Feb. 14, 1928.

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1,659,158

APPARATUS FOR DISPERSING IRRITANTS

Original Filed April 30, 1924

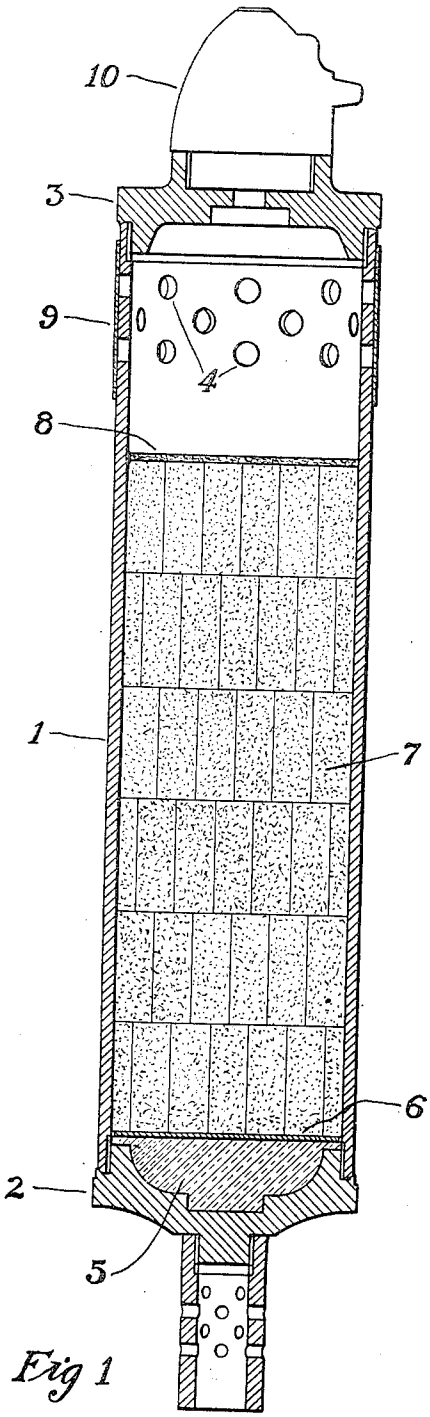


Fig 1

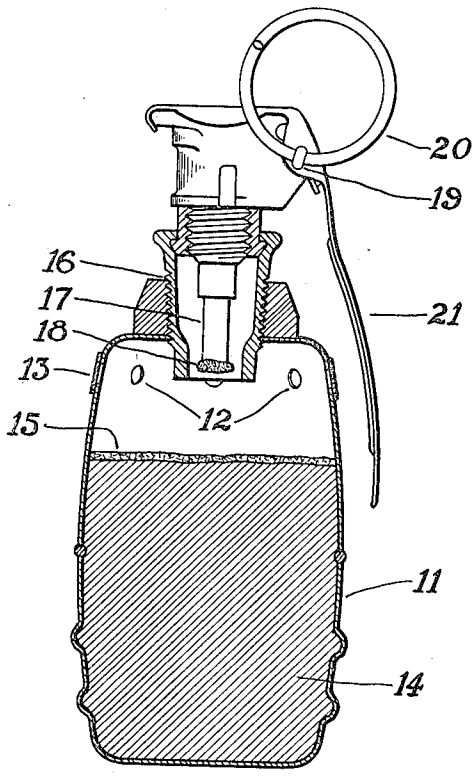


Fig 2

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Patented Feb. 14, 1928. 1,659,158

UNITED STATES PATENT OFFICE.

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APPARATUS FOR DISPERSING IRRITANTS.

Application filed April 30, 1924, Serial No. 710,172. Renewed July 17, 1926.

This invention relates to an apparatus for dispersing irritants including those which are lachrymating as well as those which are toxic.

Among the objects of this invention is to provide an apparatus whereby irritants particularly those not readily volatile at ordinary temperatures may be dispersed into the atmosphere in substantially non-persistent form without undergoing decomposition.

A further object of this invention is to provide a device whereby the irritant may be evolved in effective concentrations without undergoing substantial chemical decomposition and without danger of explosions which render the apparatus ineffective in so far as dispersion of the irritant is concerned. These explosions also cause dangerous fragments to fly from the device which are to be avoided in a device for mob dispersion and similar uses where deaths or serious injuries should be avoided.

More specifically it is an object of this invention to provide an apparatus containing a cooling and expansion chamber for receiving the evolved irritant and having suitable openings for permitting the escape of the evolved irritant from said chamber.

This invention is applicable to irritants such as capsaicin and diphenylchlorarsine, and also irritants which have pronounced lachrymating properties such as chloracetophenone, bromacetophenone, p-bromchloracetophenone or iodoacetophenone.

Reference is to be had to the accompanying drawings wherein specific devices embodying this invention are shown.

Fig. 1 is a vertical section of a Stokes shell with an impact fuse at one end.

Fig. 2 is a vertical section of a hand grenade provided with a standard form of bouchon.

Referring to Fig. 1, the Stokes shell comprises the main metal body (1) of suitable material, such as thin steel, connected with the base (2) and head (3). Near the head end the body (1) contains a plurality of perforations (4). Ordinarily, the interior of these shells is irregular at the base and the cavity is filled with a suitable material (5), such as paraffin, and upon this is placed a metal disc (6).

The shell is loaded by stacking upon the metal disc (6) for the depth desired cakes or blocks of powder (7) such as nitrocellulose, of suitable size, for example 12-inch rifle powder, and the shell and powder are then brought to a temperature of about 50° C. A small amount of nitrocellulose powder of smaller calibre (for example .30 calibre rifle powder) previously heated to about the same temperature is then poured so as to sift its way into the spaces between the large blocks of powder. In using an irritant such as chloracetophenone, the irritant is heated to a temperature of 85–90° C. and about 6% MgO is stirred into the molten irritant to form a substantially uniform suspension, which is then poured into the shell so as to fill the interstices between the pieces of powder. The MgO is used as a stabilizer in the mix. Molten or liquefied chloracetophenone is then added as the shell cools until when cold the chloracetophenone and nitrocellulose powder are at about the same level. The MgO is added to the mixture for the purpose of stabilization, it being an antiacid and tends to overcome or counteract the tendency for slow decomposition to develop in the mixture after preparation.

When the mass has cooled it is thoroughly covered with a starter paste (8) so that none of the surface remains exposed. A suitable starter paste may be made by thoroughly mixing 2 parts of a dry starter to 1 part of a binding solution. The dry starter consisting of:

	Parts.
FeS (100 mesh)	1
Hammer scale or iron oxide (80 mesh)	1
Meal powder	2

The binding solution may consist of a solution of celluloid in acetone of about 4%.

The openings (4) are covered by a thin strip of zinc (9) soldered to the metal body of the shell. The head (3) carrying the impact fuse (10) is then screwed on to the body (1) of the shell.

In operation, as the impact fuse functions the zinc strip (9) blows off and the starter (8) burns and in turn ignites the powder irritant mixture. The powder burns and generates hot gases which carry off the irritant volatilized thereby as an entrained component, the exit gases passing through the openings (4) into the air.

The shell is filled so as to provide a substantial space between the top of the irritant-

fuel mixture and the head (3). The evolved combustion gases and irritant expand in this space and become cooled to an appreciable extent and issue from the openings (4) at a temperature below that at which flashing or substantial decomposition of the irritant would occur on coming in contact with the oxygen of the air, thus rendering the dispersion of the irritant highly efficient and minimizing to a large extent, if not entirely, the waste of irritant which would otherwise occur by chemical reaction or decomposition into compounds or compositions lacking the desired properties of the irritant.

Referring to Fig. 2, the grenade comprises the body (11) which is made of suitable metal, such as thin steel, and is provided with a plurality of openings (12). These holes are preferably covered with adhesive tape (13) which is subsequently coated with shellac.

In loading this grenade with a mixture (14) of chloracetophenone, nitrocellulose and a suitable stabilizer, such as MgO, the materials may be intimately mixed and the required amount placed in the container. The container is then heated by placing the grenade in boiling water (not allowing the water to enter the grenade) until the mixture becomes more or less plastic. The grenade is then removed from the water and the mixture pressed or tamped until compact. The heating should be sufficient to melt the chloracetophenone in order that the mixture (14) will tamp or press compactly, but overheating should be avoided as this will result in a solution of smokeless powder in chloracetophenone, which will not remain fluid at or below 100° C. and the mixture will not compress or pack well. A suitable mixture may be made of:

	Parts.
Nitrocellulose (.30 calibre)	24
Chloracetophenone	9
MgO	1

After the mass has cooled, the starter paste (15) is applied. This starter paste may consist of substantially equal parts of meal powder and 3½% solution of celluloid dissolved in acetone. The grenade is then allowed to stand open for about 12 hours until the starter paste has hardened.

The firing mechanism is then screwed on to the grenade at (16). This firing mechanism is of standard construction and comprises the bouchon having the fuse (17) which has the end tip (18) consisting of a paste similar to the starter (15).

In operating the grenade the pin (19) is withdrawn by pulling the ring (20). The strap (21) is then released and flies off which permits the firing mechanism to function, thereby igniting the fuse (17). The fuse, which is preferably a time fuse, after the pre-determined delay fires the tip (18) which in turn fires the starter (15). As this starter burns the mixture (14) is ignited, the tape is blown from the exit holes and the irritant is evolved through the openings (12) in the manner heretofore described in the Stokes shell.

Although the construction and operation of a hand grenade are illustrated, this invention may be readily adapted to a rifle grenade, a bomb to be dropped from aeroplanes and similar devices.

These devices admit of the dispersion of the irritating gas without bursting the container and without flashing (i. e. ignition of the irritant on coming in contact with air) since the gases are cooled appreciably in the expansion space and the gases are released fairly rapidly into the air through openings in the cooling chamber which result in sudden cooling of the gas. If released sufficiently rapidly this sudden cooling will virtually blow out any flame that may start, but danger of exploding the device arises and it is therefore advisable to do some cooling within the expansion space.

The present invention is not limited to the specific details set forth in the foregoing examples which should be construed as illustrative and not by way of limitation, and in view of the numerous modifications which may be effected therein without departing from the spirit and scope of this invention, it is desired that only such limitations be imposed as are indicated in the appended claims.

We claim as our invention:

1. In a device for dispersing an irritant, a container having a cake of an intimately distributed mixture of an irritant and a fuel which burns at a temperature sufficient to volatilize the irritant but below that at which the irritant will decompose within the time required for said volatilization, an expansion and cooling chamber adjacent to and communicating with said mixture and means for igniting said mixture.

2. In a device for dispersing an irritant, a container having in a portion thereof a compact, intimately distributed mixture of a lachrymating compound and a fuel which burns at a temperature sufficient to volatilize the lachrymator but below that at which the lachrymator will decompose within the time required for said volatilization, an adjacent, communicating portion of sufficient size to admit expansion and cooling of the gases evolved from said mixture nad means for igniting said mixture.

3. In a device for dispersing an irritant, a container having a compact cake of an intimately distributed mixture of an irritant and a fuel which burns at a temperature sufficient to volatilize the irritant but below that at which the irritant will decompose

within the time required for said volatilization, means comprising an opening in said container for permitting the escape of the gases evolved from said mixture and means for igniting said mixture.

4. In a device for dispersing an irritant, a container having in a portion thereof a stabilized, compact, intimately distributed mixture of an irritant and a fuel which burns at a temperature sufficient to volatilize the irritant but below that at which the irritant will decompose within the time required for said volatilization, an adjacent, communicating portion of said container of sufficient size to admit expansion and cooling of the gases evolved from said mixture and provided with an opening for permitting escape of said evolved gases and means for igniting said mixture.

5. In a device for dispersing an irritant, a container having a cake of an intimately distributed mixture of an irritant and a fuel which burns at a temperature sufficient to volatilize the irritant but below that at which the irritant will decompose within the time required for said volatilization, an expansion and cooling chamber adjacent to and communicating with said mixture, a starter composition upon the surface of said cake for igniting said mixture and means for igniting said starter composition.

6. In a device for dispersing an irritant, a container having a stabilized, compact, intimately distributed mixture of an irritant and a fuel which burns at a temperature sufficient to volatilize the irritant but below that at which the irritant will decompose within the time required for said volatilization, means comprising an opening in said container for permitting the escape of the gases evolved from said mixture, a starter composition integrally secured to the surface of said cake for igniting said mixture and means for igniting said starter composition.

7. In a device for dispersing an irritant, a container having in a portion thereof a cake of an intimately distributed mixture of an irritant and a fuel which burns at a temperature sufficient to volatilize the irritant but below that at which the irritant will decompose within the time required for said volatilization, an adjacent, communicating portion of sufficient size to admit expansion and cooling of the gases evolved from said mixture, a starter composition cemented to the surface of said cake for igniting said mixture and means for igniting said starter composition.

8. In a device for dispersing an irritant, a container having in a portion thereof a cake of an intimately distributed mixture of an irritant and a fuel which burns at a temperature sufficient to volatilize the irritant but below that at which the irritant will decompose within the time required for said volatilization, an adjacent, communicating portion of sufficient size to admit expansion and cooling of the gases evolved from said mixture and provided with an opening for permitting escape of said evolved gases, a starter composition cemented to the surface of said cake and having a portion thereof assimilated with said mixture, and means for igniting said starter composition.

9. A device for dispersing an irritant, comprising a vaporizable irritant, means for converting it into a vapor having a temperature at which it would decompose in air, and means whereby the vaporized irritant is cooled before it leaves the device.

10. A device for dispersing an irritant, comprising a vaporizable irritant, means for converting it into a vapor having a temperature at which it would decompose in air, and a cooling and expansion chamber through which the vaporized irritant passes on its way out of the device.

11. A device for dispersing an irritant, comprising a vaporizable irritant, a fuel adapted to give off hot gases effective for converting the irritant into a vapor having a temperature at which it would decompose in air, and means whereby the vaporized irritant is cooled before it leaves the device.

12. The method of dispersing an irritant which includes subjecting a vaporizable irritant in an enclosure to heat so as to convert it into a vapor having a temperature at which it would decompose in air, and cooling the vaporized irritant before it leaves the enclosure.

13. The method of dispersing an irritant which is a halogen derivative of acetophenone, which includes subjecting the irritant within an enclosure to heat so as to convert the halogen derivative of acetophenone into a vapor, and cooling the vapor before it leaves the enclosure.

14. A device for dispersing an irritant, comprising a vaporizable irritant, a fuel which is effective for converting the irritant into a vapor having a temperature at which it would decompose in air, the fuel and the irritant being relatively so disposed that the irritant is exposed to the hot products of combustion of the fuel, and means whereby the vaporized irritant and the products of combustion are cooled on their way out of the device.

15. A device for dispersing an irritant, comprising a container having therein a vaporizable irritant and a fuel capable of self-sustaining combustion, the irritant being within the combustion zone of the fuel so as to be directly exposed to the flame thereof, and means whereby the vaporized irritant is cooled on its way out of the device.

16. A device for dispersing an irritant, comprising a container having therein a vaporizable irritant and a fuel capable of

self-sustaining combustion, the irritant being within the combustion zone of the fuel so as to be directly exposed to the flame thereof, and a cooling and expansion chamber through which the vaporized irritant passes on its way out of the device.

17. A device for dispersing an irritant, comprising a container having therein a mixture of chloracetophenone and a fuel capable of self-sustaining combustion, effective for vaporizing the chloracetophenone, and means whereby the vaporized chloracetophenone is cooled on its way out of the device.

18. A device for dispersing an irritant comprising a container having therein a vaporizable irritant and a chemical capable of producing a heat generating reaction, the irritant being within the reaction zone of the chemical so as to be exposed to the heat thereof, and means whereby the vaporized irritant is cooled on its way out of the device.

19. A device for dispersing an irritant comprising a container having therein a vaporizable irritant and a chemical capable of producing a heat generating reaction, the irritant being within the reaction zone of the chemical so as to be exposed to the heat thereof, and a cooling and expansion chamber through which the vaporized irritant passes on its way out of the device.

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